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REPORT NO. FAA-ASF-80-3

COMPLETED ORIGINAL

81-32

SUMMARY OF
AVIATION SAFETY PROGRAM RESUMES

CABIN SAFETY

COMPLETED
29

SPECIAL REPORT

AUGUST 1980

Document is available to the U.S. public through
the National Technical Information Service,
Springfield, Virginia 22161.

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Office of Aviation Safety
Washington, D.C. 20590

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Technical Report Documentation Page

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FAA-ASF-80-3		

4. Title and Subtitle	5. Report Date
SUMMARY OF AVIATION SAFETY PROGRAM RESUMES CABIN SAFETY	October 1980
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15. Supplementary Notes

16. Abstract

This report contains a Program Activity Resume and a Project Details listing of those activities supporting the FAA Cabin Safety Program. The Cabin Safety Activity Resume identifies three sub-programs relating to Inflight, Crashworthiness, and Post Crash safety activities. The sub-programs are identified and reported in the Project Details listing which includes: Inflight Fire, Operational Hazards, Training & Duties, Crash Scenario Definition, Structural Load Analysis, Crashworthy Fuel Tanks, Fuel Fire Hazard, Cabin Interior Materials, Crew Considerations, Crash Rescue, SAFER Advisory Committee and Evacuation Systems.

Program documentation for the major portion of these activities is identified in the following FAA plans:

E&D Program Plan FAA-ED-18-6 Aircraft Crashworthiness, June 1980.
E&D Program Plan FAA-ED-18-7 Aircraft Cabin Fire Safety, June 1980.
E&D Program Plan FAA-ED-18-4 Antimisting Fuel, Sept. 1980.
ASF Program Plan FAA-ASF-80-2 Inflight Cabin Safety (Draft), August 1980.

17. Key Words		18. Distribution Statement
Crash Rescue	Cabin Materials	Document is available to the U.S. public through the National Technical Information Service, Springfield, Virginia 22161.
Crashworthiness	Cabin Fire Safety	
Cabin Safety	Evacuation Systems	
Inflight Fire	Antimisting Fuel	
Crash Scenario	Crashworthy Fuel Tanks	

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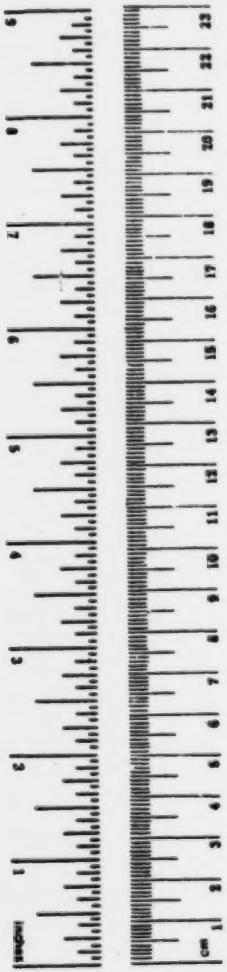
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

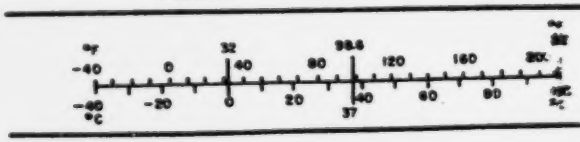
Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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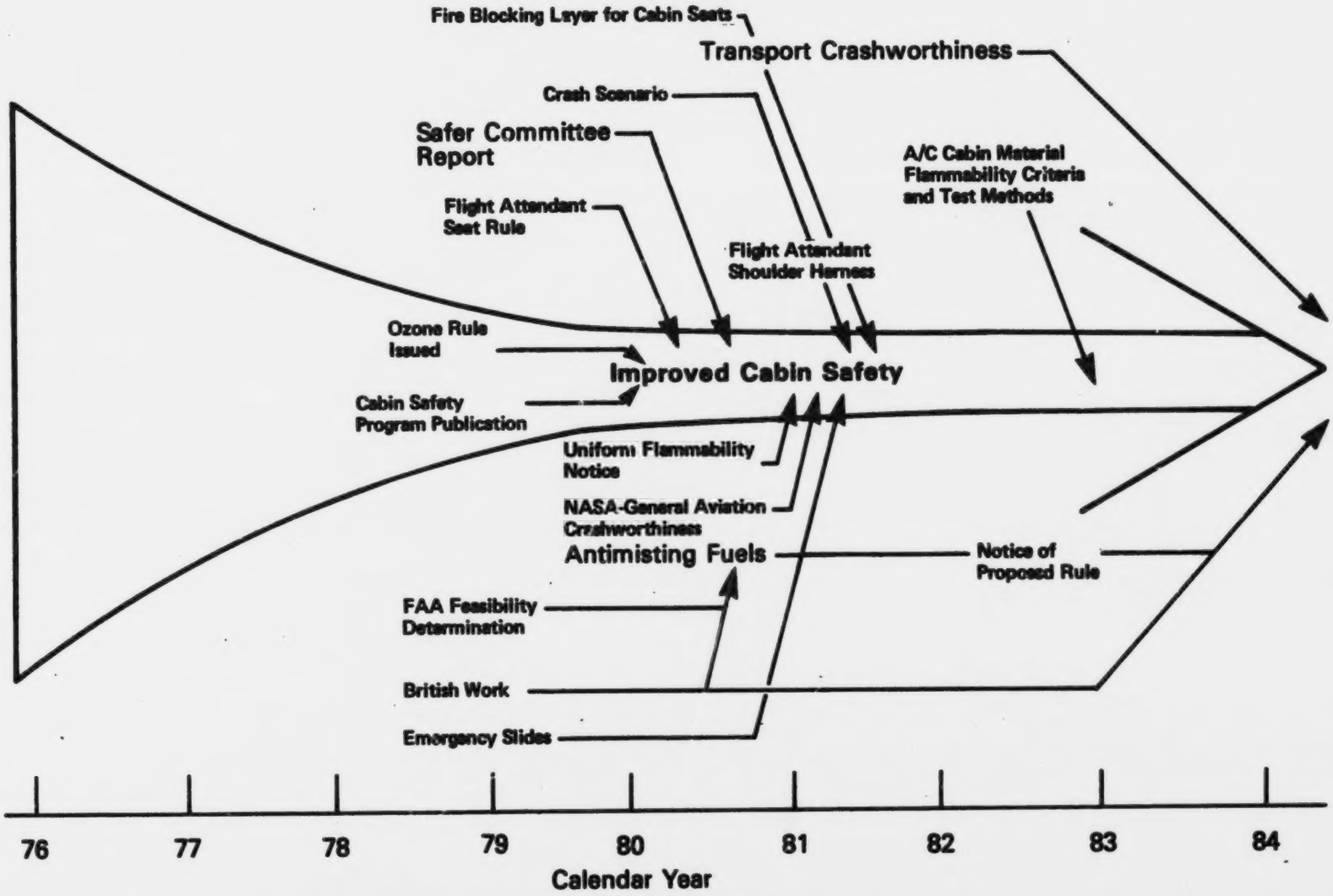
FAA Cabin Safety Program
Representative Key Activities



FOREWORD

FAA Aviation Standards Program Activity Resumes and associated Project Details are developed and maintained with periodic updates by the Office of Aviation Safety to provide a current information system regarding a number of safety program activities. The information system is formatted to provide essential information regarding safety problems, issues, objectives, milestone schedules, management review, assessment and decision-making associated with program direction, scheduling, resource allocation, ordering of priorities, and planning for operational implementation of program results.

This report contains a Program Activity Resume and a Project Details listing of those activities supporting the FAA Cabin Safety Program. The Cabin Safety Activity Resume identifies three sub-programs relating to Inflight, Crashworthiness, and Post Crash safety activities. The sub-programs are identified and reported in the Project Details listing which includes: Inflight Fire, Operational Hazards, Training and Duties, Crash Scenario Definition, Structural Load Analysis, Crashworthy Fuel Tanks, Fuel Fire Hazard, Cabin Interior Materials, Crew Considerations, Crash Rescue, SAFER Advisory Committee, and Evacuation Systems.

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ASF Program Plan FAA-ASF-80-2 Inflight Cabin Safety (Draft), August 1980.

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Currency Summary

This is a computer generated information document to be used as a management tool to monitor and evaluate the progress of the various FAA safety programs. It provides timely information to assist in identifying program accomplishments, results, delays, recommendations for program redirection, etc.

The currency of the information is maintained through periodic updates of no less than one update per calendar quarter, with updating responsibility resting with the principal specialist(s) identified on the program resume. Comments concerning information in the resumes should be directed to the specialist(s) concerned.

A routine quarterly listing of all aviation safety program and project resumes are scheduled for retrieval from computer storage on the first working day of each quarter. Special listings may be obtained at any time.

Currency of the enclosed resumes:

Most current update: 08/04/80

Least current update: 08/04/80

Program milestones not accomplished on schedule as of 08/04/80:

Program/Project Title	Activity	Page
None		

Major program schedule change(s) entered 08/04/80:

Program/Project Title	Activity	Page	Schedule Change
Crash Scenario Definition	ASF-300-1D	1,7	+ 8 Months
Crashworthy Fuel Tanks	ASF-300-1F	1,9	+ 3 Years

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SAFETY PROGRAM RESUME INDEX

MAJOR PROGRAM	SUBPROGRAM	PROJECT	ACTIVITY NO.	PAGE
CABIN SAFETY			ASF-300-1	1
	INFLIGHT			
		Inflight Fire	ASF-300-1A	2
		Operational Hazards	ASF-300-1B	3
		Training & Duties	ASF-300-1C	5
	CRASHWORTHINESS			
		Crash Scenario Definition	ASF-300-1D	7
		Structural Load Analysis	ASF-300-1E	8
		Crashworthy Fuel Tanks	ASF-300-1F	9
	POST CRASH			
		Fuel Fire Hazard	ASF-300-1G	10
		Cabin Interior Materials	ASF-300-1H	11
		Fire Management	ASF-300-1I	12
		Crew Considerations	ASF-300-1J	13
		Crash Rescue	ASF-300-1K	15
		SAFER Advisory Committee	ASF-300-1L	16
		Evacuation Systems	ASF-300-1M	17

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AVS PROGRAM ACTIVITY RESUME

Date of Resume: 10/01/80 Program Activity No. ASF-300-1

PROGRAM/PROJECT TITLE

CABIN SAFETY

OBJECTIVES

Inflight - Reduce injuries and hazards associated with: inflight cabin system functions; environmental factors; and, passenger activities.

Crashworthiness - Reduce injuries, fatalities and hazards associated with aircraft/surface impact.

Post Crash - Reduce injuries, fatalities and hazards associated with post crash factors.

REQUIREMENT

The requirement is based on a need to enhance the safety level of the cabin with a thorough review of all relevant factors.

MILESTONE SCHEDULE	Initial	Current	Actual
Inflight			
Inflight Fire	1/81		
Operational Hazards	5/81		
Training & Duties	8/81		
Crashworthiness			
Crash Scenario Definition	11/80	6/81	
Structural Load Analysis	12/82		
Crashworthy Fuel Tanks	12/81	1984	
Post Crash			
Fuel Fire Hazard	11/80	(See Note 1.)	
Cabin Interior Materials	2/82		
Fire Management	12/82		
Crew Considerations	12/80		
Crash Rescue	5/82		
SAFER Advisory Committee Recomendations	6/80	10/80 (See Note 2.)	
Evacuation Systems	3/81		

STATUS		
	E&D Program Plan FAA-ED-18-6 Aircraft Crashworthiness	Approved 6/80
	E&D Program Plan FAA-ED-18-7 Aircraft Cabin Fire Safety	" "
	E&D Program Plan FAA-ED-18-4 Antimisting Fuel	" "
	ASF Program Plan FAA-ASF-80-2 Inflight Cabin Safety (Draft)	

REMARKS/NOTES

Note 1. Decision on practicality of concept.

Note 2. SAFER Recommendation.

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1. PROJECT TITLE: INFLIGHT FIRE UPDATE: 8/4/80

2. RELATED PROGAM/PROJECTS: Inflight Cabin Safety - Operational Hazards

3. OBJECTIVE:

Develop criteria to be used to minimize the potential hazard from fire in the cabin, lavatory and galleys.

4. PROBLEM (Source, Scope, History & Documentation, etc.)

Injuries to passengers and flight crew from inflight fires should be reduced. Procedures, as well as design criteria, should be developed to require improved flight crew performance and provide use of improved materials.

5. CURRENT STATUS (Interim Actions)

A study of the fire hazards associated with the lavatory has been completed by NASA. However, work underway addressing cabin materials will minimize the inflight fire hazard in other portions of the cabin.

6. ISSUES (Advocates/Critics, Rationale)

Can improved materials reduce the hazard to occupants?

Can alternative smoke evacuation procedures be developed?

Are alternative fire extinguishants needed?

7. ALTERNATIVES (Impacts: Cost, Energy, Environment, OSHA, etc.

a. Continue to accept the current design practice with respect to interior cabin furnishings.

b. Re-evaluate, with a critical review of representative transport category aircraft inflight fires, to determine whether hazards exist which are not being addressed, and if so, identify actions which can be done to reduce the risk.

8. RECOMMENDATIONS/ACTIONS:

Implement Alternative b. through the FAA Technical Center using information from aircraft manufacturers, airlines and Cabin Safety Reporting System.

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1. PROJECT TITLE: OPERATIONAL HAZARDS UPDATE: 8/4/80

2. RELATED PROGAM/PROJECTS: Inflight Cabin Safety

3. OBJECTIVE:

Examine potential inflight hazards as they relate to operational factors, environmental factors and cabin equipment; recommend appropriate agency action; and, monitor effectiveness of existing regulations.

4. PROBLEM (Source, Scope, History & Documentation, etc.)

Turbulence, smoke from cabin fire, and improperly secured serving carts can present serious safety problems. The adequacy of first-aid kits; the number and location of megaphones, flashlights, public address systems and emergency oxygen; the storage of carry-on luggage; and, the environmental factors associated with ozone, ambient noise and smoke levels, as well as the long-term effects of flying, have created concern, particularly among flight attendants.

5. CURRENT STATUS (Interim Actions)

OPERATIONAL FACTORS - The potentially hazardous operational factors of turbulence, smoke from cabin fire and improperly secured carts is being included in a formal Inflight Cabin Safety Program currently being developed.

CABIN EQUIPMENT - The number and location of megaphones, flashlights, public address systems, and emergency oxygen; and, the storage of carry-on baggage has recently been addressed in Airworthiness Review Amendment #8 and Operation Review Amendment #8. The adequacy of the first-aid equipment needs to be given a close examination. This examination and a study of the alternatives available to the FAA is being included in the new Inflight Cabin Safety Program.

ENVIRONMENTAL FACTORS - The FAA issued rules regarding ozone in February 1980 (FARs 25.832 and 121.220). No regulatory action has been taken on ambient noise or smoke levels. An identification of the long-term effects of these factors as well as others associated with flying does not have the benefit of extensive scientific research. Therefore, very little information is available to answer questions posed by concerned persons.

6. ISSUES (Advocates/Critics, Rationale)

OPERATIONAL FACTORS - Flight attendants attribute occupational injuries to: the excessive weight of serving carts; inadequate cart braking systems and tie-downs; and turbulence on short-haul beverage/snack serving flights where there is little time to accomplish the inflight service functions. In the absence of a comprehensive flight attendant occupational injury reporting system, it is difficult to accurately assess the safety issues.

CABIN EQUIPMENT - Many of the concerns regarding cabin equipment have been addressed in recent regulatory action (see Current Status); however, there is concern on the part of passengers and flight attendants that first-aid

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equipment is inadequate. An identification of the specific issues and a review of the alternatives to resolve these issues will be undertaken as a part of the Inflight Cabin Safety Program.

ENVIRONMENTAL FACTORS - Flight attendants are concerned about the long-term effects of flying; however, since very little scientific research has been done in this area, the specific issue may be the lack of information on which to provide adequate answers.

7. ALTERNATIVES (Impacts: Cost, Energy, Environment, OSHA, etc.)

a. Develop an in-house program activity to respond to all problems identified above.

b. Develop an in-house program to respond to the problems associated with operational factors and cabin equipment, including the enhancement of the Cabin Safety Reporting System.

c. Coordinate with the Occupational Safety and Health Administration activities, supporting the research efforts of the National Institute of Occupational Safety and Health to identify possible occupational health hazards associated with flying.

8. RECOMMENDATIONS:

Implement Alternatives b. and c.

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1. PROJECT TITLE: TRAINING AND DUTIES UPDATE: 8/4/80

2. RELATED PROGAM/PROJECTS: Inflight Cabin Safety

3. OBJECTIVE:

Examine present airline training procedures to ensure adequate flight attendant training in: first-aid; briefing and handling of handicapped passengers; hijacking or other incidents including interference with a flight attendent; and cockpit/cabin communication.

4. PROBLEM (Source, Scope, History & Documentation, etc.)

FIRST AID - The amount of first aid training, particularly cardio-pulmonary resuscitation training, differs between airlines.

SPECIAL HANDLING PASSENGERS - Handicapped passengers require special attention from flight attendents with respect to seat location and preflight briefing to ensure rapid egress in the event of an emergency evacuation.

UNUSUAL INCIDENTS - There has been an increase in both the number of attempted hijackings and incidents of harassment or interference with flight attendents.

COCKPIT/CABIN COMMUNICATION - Methods of cabin communication between the cockpit and the cabin crew differ among airlines and among crews within the same airlines.

5. CURRENT STATUS (Interim Actions)

The FAA has not established required guidelines for training flight attendants in these areas. However, FAR 121.571 requires flight attendants to brief handicapped passengers prior to takeoff. The FAA has recently developed a film on hijacking as recommended training for flight attendent training.

6. ISSUES (Advocates/Critics, Rationale)

Passengers and flight attendents alike have expressed concern over the adequacy of flight attendent training, particularly in the handling of inflight medical emergencies.

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7. ALTERNATIVES (Impacts: Cost, Energy, Environment, OSHA, etc.)

a. Maintain present training requirements.
b. Require training in all areas.
c. Require training in some areas and consider additional training in others.

8. RECOMMENDATIONS/ACTION:

Implement alternative c. - Develop a regulatory project to introduce a Notice of Proposed Rule Making to require additional first aid training, including certification in cardio-pulmonary resuscitation. Examine current training procedures to ensure adequate flight attendent training in briefing and handling of handicapped passengers and in hijacking or other incidents involving interference with a crewmember. Also consider the possibility of improved standardization of cabin/cockpit communication procedures.

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1. PROJECT TITLE: CRASH SCENARIO DEFINITION UPDATE: 8/4/80

2. RELATED PROGAM/PROJECTS

Cabin Safety/Crashworthiness - Structural Load Analysis Project

3. OBJECTIVE:

Define the loads that a transport category aircraft could be exposed to as a result of a crash that might occur on takeoff, approach or landing.

4. PROBLEM (Source, Scope, History & Documentation, etc.)

Accidents in which occupant survival could be enhanced continue to occur. A better understanding is required concerning the impact loads and the way these loads are absorbed, distributed and finally transmitted to the seat, restraint system and occupant.

5. CURRENT STATUS (Interim Actions)

Using FAA/NASA funds and an interagency agreement, NASA has awarded contracts to Lockheed, Boeing and Douglas to review their respective accident data for each of certain of their designs and propose a set of conditions that would be representative of identifiable crash scenarios. The contract was issued 1/80. Completion is scheduled for 6/81.

6. ISSUES (Advocates/Critics, Rationale)

Can one or even a reasonable number of crash scenarios represent the crash impact conditions adequately to aid in design improvement, considering that each crash is, to a degree, unique? The initial effort by Lockheed, Boeing and Douglas will be addressing this question.

7. ALTERNATIVES (Impacts: Cost, Energy, Environment, OSHA, etc.)

a. Do nothing and accept the current accident/fatality rate.

b. Explore, through a cooperative task with NASA, the possibility that crashworthiness improvements can be developed and used by the industry.

8. RECOMMENDATIONS/ACTION

Continue with the cooperative task with NASA to define the transport category aircraft crash scenario(s) to support crashworthiness improvements. Reference: FAA-ED-18-6, Aircraft Crashworthiness, June 1980, Sections 1.3, 1.4, & 2.1.1 Task D.

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1. PROJECT TITLE: STRUCTURAL LOAD ANALYSIS UPDATE: 8/4/80

2. RELATED PROGAMS/PROJECTS

Cabin Safety/Crashworthiness - Crash Scenario Definition Project

3. OBJECTIVES

Develop a method to apply the conditions established by the Crash Scenario Definition Project to evaluate the effect of those load conditions on the fuselage structure and thereby determine the loads that a seat, restraint system and occupant would experience. The value of the loads will determine if changes are required to the regulations. The same approach will be used to evaluate floors, galleys and serving carts.

4. PROBLEMS (Source, Scope, History & Documentation, etc.)

A general concern that more occupants of an aircraft could survive if installed items such as seats, galleys, etc., were designed to withstand a dynamic crash impulse load as opposed to those established by our current static test regulation.

5. CURRENT STATUS (Interim Actions)

Work currently underway is being done by the FAA Technical Center and CAMI. This is a validation of a single occupant, general aviation type seat. The work of developing design criteria and a means of demonstrating compliance to such criteria for multiple occupant seats awaits the development of the necessary technology. The latter will be a cooperative effort by CAMI and FAATC. It is expected that this work will begin 10/80 and end 12/82.

6. ISSUES (Advocates/Critics, Rationale)

The aviation industry will not develop such methodology at their own expense. If a requirement for increased crashworthiness is established it must be imposed on all new designs at a given time. Only the government has the authority and responsibility to accomplish the program objectives.

7. ALTERNATIVES (Impacts: Cost, Energy, Environment, OSHA, etc.)

a. Maintain the current static crash loads requirements and accept the philosophy that no improvement is needed.

b. Proceed with the FAA/NASA cooperative effort to develop means of improving occupant survivability in a crash to the point that the concept is proven not practical or to the point that a methodology is available and criteria for new designs can be established.

8. RECOMMENDATIONS/ACTION: Continue with Alternative b. Reference: Report FAA-ED-18-6, Aircraft Crashworthiness, June 1980, Section 1.2b, 1.3b, 1.4b, and 3.0.

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PROJECT DETAILS ASF-300-1F

1. PROJECT TITLE: CRASHWORTHY FUEL TANKS UPDATE: 8/4/80

2. RELATED PROGAM/PROJECTS

Crash Scenario Definition & Post Crash Fire Hazard

3. OBJECTIVES

Establish design criteria and a method of compliance for crashworthy auxiliary fuselage fuel tanks.

4. PROBLEM (Source, Scope, History & Documentation, etc.)

The rupture of auxiliary fuselage fuel tanks during a crash; the subsequent fuel release; and resulting fire contributes to the fatalities of the occupants.

5. CURRENT STATUS (Interim Actions)

This project is scheduled to be initiated 1/81.

6. ISSUES (Advocates/Critics, Rationale)

Is the current industry practice for auxiliary fuel tank design adequate? Have there been survivable crashes where such tanks have ruptured and the resulting fire contributed to the number of fatalities? Is there logic in increasing the crashworthiness of auxiliary fuselage fuel tanks when little can be done to the wing tanks which usually carry a greater quantity of fuel?

7. ALTERNATIVES (Impacts: Cost, Energy, Environment, OSHA, etc.)

a. Accept present state-of-the-art design concepts.

b. Establish design criteria for improved crashworthiness of auxiliary fuselage fuel tanks. This will be based upon the results of work initiated according to program plans and beginning with the procurement and testing of production fuselage fuel tanks to determine actual structural capability.

8. RECOMMENDATIONS/ACTION

Proceed with alternative b. Reference report FAA-ED-18-6, Aircraft Crashworthiness, June 1980, Section 4.

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1. PROJECT TITLE: FUEL FIRE HAZARD UPDATE: 8/4/80

2. RELATED PROGRAM/PROJECTS: Cabin Safety - Crashworthiness

3. OBJECTIVE:

Encourage the development of an additive that can be mixed with aviation kerosene and that will reduce the tendency of the fuel to form a fine mist when released from a ruptured fuel tank.

4. PROBLEM (Source, Scope, History & Documentation, etc.)

It is estimated that between 30 to 40 percent of the fatalities resulting from impact-survivable crashes can be attributed to fire which is usually associated with burning fuel from a ruptured fuel tank.

5. CURRENT STATUS (Interim Actions)

A maximum effort is being conducted by the U.S. (NASA, FAA) and the U.K. to establish by October-November 1980 evidence that an additive can be mixed with turbine fuel to provide the protection desired with minimal system component changes and at an acceptable cost.

6. ISSUES (Advocates/Critics, Rationale)

Considering the current and projected future cost of aviation fuel, is it realistic to impose an additional requirement that aviation kerosene have an antimisting additive to minimize the post crash fire potential?

7. ALTERNATIVES (Impacts: Cost, Energy, Environment, OSHA, etc.)

Other than taking no action, there are no simple alternatives. The use of crashworthy fuselage fuel tanks would be only a partial solution. The conventional wet wing design is highly vulnerable to being breached and permitting the release of fuel that, when ignited, forms a fire ball.

8. RECOMMENDATION/ACTION:

Continue with the current effort to obtain the maximum amount of information on antimisting kerosene by the October-November 1980 time frame. Initiate a cost/effective study to assess the economic impact of the use of antimisting kerosene.

A decision on whether to proceed with work required to define a modified fuel specification and regulation requiring its use can await the information currently being developed. A program to implement the use of antimisting kerosene would probably cost between $10 and $20 million during FY81 through FY84 to obtain resolution of various considerations imposed by routine use. Reference: E&D program plan, Report No. FAA-ED-18-4, Antimisting Fuel, June 1980.

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1. PROJECT TITLE: CABIN INTERIOR MATERIALS UPDATE: 8/4/80

2. RELATED PROGRAM/PROJECTS: Cabin Safety - Post Crash

3. OBJECTIVE:

The development of criteria that would support the use of interior materials that are: more difficult to ignite; have a reduced flame spread rate; and, have less propensity to produce smoke and toxic fumes.

4. PROBLEM (Source, Scope, History & Documentation, etc.)

There is evidence to support the claim that between 30 to 40 percent of the fatalities resulting from impact-survivable crashes are related to fire and its effects. Burning interior cabin materials, aside from the basic fire threat, produce smoke that limits visibility and gases that can incapacitate an occupant, preventing a timely evacuation.

5. CURRENT STATUS (Interim Actions)

A C-133 airplane fuselage used at the Technical Center for fire tests has been moved into the building and is currently being instrumented. Testing of interior cabin materials in this fuselage should begin in August. The ability to conduct the tests throughout the year under controlled conditions is now a possibility. The Douglas Company should complete their contractural requirements to develop a Combined Hazard Index for materials by December 1980. The index weighs the hazard from flame spread rate, heat release, smoke and toxic gases against the occupants' time remaining to escape. NASA is supporting the development of improved interior cabin materials to reduce the hazard associated with a post crash fuel fed fire. The University of Dayton is completing a three dimensional math model that is to be used to predict the behavior of burning cabin material.

6. ISSUES (Advocates/Critics, Rationale)

Establish the level of hazard from burning cabin material versus heat, smoke and gases released from burning aviation kerosene. Having established the relative hazard from burning fuel and material, the FAA must determine if the flammability of interior materials must be further regulated.

7. ALTERNATIVES (Impacts: Cost, Energy, Environment, OSHA, etc.)

a. Maintain current standards and monitor what aircraft manufacturers are doing to improve interior materials technology.

b. Continue with the current FAA/NASA program to develop and test interior materials to define criteria for the use of safer materials in transport category aircraft.

8. RECOMMENDATION/ACTION: Continue with Alternative b. Reference: E&D program plan, Report No. FAA-ED-18-7, Aircraft Cabin Fire Safety, June 1980, Section 2.1 through 2.2.8.

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1. PROJECT TITLE: FIRE MANAGEMENT UPDATE: 8/4/80

2. RELATED PROGRAM/PROJECTS: Post Crash Cabin Safety/Fuel Fire Hazard, Cabin Interior Materials; Crashworthiness

3. OBJECTIVE:

Develop concepts to inhibit the progress of a post crash fuel fed fire. Once proven effective, these concepts would form the basis for advisory information.

4. PROBLEM (Source, Scope, History & Documentation, etc.)

The manner and rapid rate in which a fire can travel the length of an airplane cabin interior in an impact-survivable crash reduces the time available for emergency evacuation.

5. CURRENT STATUS (Interim Actions)

The planning for the tests of different concepts such as compartmentation, smoke venting, advanced fire extinguishants, is underway at the Technical Center. Actual tests should begin in 1980.

6. ISSUES (Advocates/Critics, Rationale)

The aviation industry is doubtful that such concepts can provide any fire safety improvement at a reasonable weight penalty; however, they have expressed the belief that the tests should be conducted to obtain data upon which a decision can be based.

7. ALTERNATIVES (Impacts: Cost, Energy, Environment, OSHA, etc.)

a. Do nothing on fire management and assume that improved cabin materials will provide the safety improvement desired. If the antimisting kerosene is effective and its use is required, then neither the Cabin Interior Materials nor the Fuel Management projects would be needed.

b. Proceed with current plans to evaluate the fire management concepts at the Technical Center.

8. RECOMMENDATION/ACTION: Continue with Alternative b. Reference: E&D program plan, Report No. FAA-ED-18-7, Aircraft Cabin Fire Safety, June 1980, Section 2.4

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1. PROJECT TITLE: CREW CONSIDERATIONS UPDATE: 8/4/80

2. RELATED PROGAM: Post Crash Cabin Safety

3. OBJECTIVE:

Examine initial and recurrent emergency training programs to ensure an adequate level of training is provided. Consider crew uniform flammability standards for increased protection in the post crash situation.

4. PROBLEM (Source, Scope, History & Documentation, etc.)

Flight attendants have expressed concern over the quality of emergency training programs. They also advocate promulgation of reasonable and effective fire retardant standards for crewmember uniforms.

5. CURRENT STATUS (Interim Actions)

TRAINING: Ops. Review Amendments 4 and 5, issued in May 1978 and Ops. Review Amendment 6 of Sept. 1978 upgraded emergency training for all crewmembers.

UNIFORM FLAMMABILITY: A public hearing on flammability standards for crewmember uniforms was held May 1980 to re-examine the issues presented in an ANPRM of MAR. 1975. The comment period has been extended for the crew uniform flammability standards until November 1980.

6. ISSUES (Advocates/Critics, Rationale)

TRAINING: The revised training standards of 1978 require "hands on" training of emergency exit doors, fire extinguishers, oxygen systems, life vests, life rafts and the use of evacuation slides. Flight attendants continue to advocate the use of improved, realistic "hands on" training as well as "on line" operating experience training.

UNIFORM FLAMMABILITY: Proponents of crew uniform flammability standards point out the vital role of flight attendants in executing an evacuation and concluded that crewmembers should be provided additional protection in the event of fire. Those who oppose a flammability standard state that there is little evidence of flight attendants suffering burn injuries that could have been prevented with special clothing.

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Crew Considerations (Cont'd.)

7. ALTERNATIVES (Impact: Cost, Energy, Environment, OSHA, etc.)

TRAINING:

a. Maintain present training standards.

b. Continue monitoring and evaluating flight attendant training programs to ensure realistic and effective emergency instruction.

UNIFORM FLAMMABILITY:

a. Do not require flame retardant clothing.

b. Establish flame retardant standards to eliminate highly flammable uniform items.

c. Require flammability standards to test the self-extinguishing characteristics and heat flux resistance of crewmember uniform material.

d. Require protective overgarments to be worn during take-off and landing or to be donned in an emergency.

8. RECOMMENDATIONS/ACTION:

TRAINING: Alternative b.

UNIFORM FLAMMABILITY: Recommendations will be made upon completing a review of evidence submitted at the public hearing and comments subsequently obtained from interested parties during the open comment period.

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PROJECT DETAILS ASF-300-1K

1. PROJECT TITLE: CRASH RESCUE UPDATE: 8/4/80

2. RELATED PROGRAM/PROJECTS: Post Crash Cabin Safety and Crashworthiness

3. OBJECTIVE:

Determine if crash-rescue functions can be more responsive when needed for an impact-survivable crash.

4. PROBLEM (Source, Scope, History & Documentation, etc.)

Most crash-rescue vehicles in use today are large and slow moving and often do not arrive at the crash site until the evacuation of the aircraft has been completed. Another problem is that many airports have barriers such as drainage ditches, fences, etc., that hamper the rescue vehicles in getting to the off-airport crash sites.

5. CURRENT STATUS (Interim Actions)

A rapid response vehicle has been developed by the FAA at the Technical Center. This vehicle could be useful for general aviation airports and airports with limited transport service.

Several extinguishing agents have been evaluated for effectiveness in inproving the crash-rescue function. Reports of these evaluations should be available in the near term for developing recommendations regarding future action.

6. ISSUES (Advocates/Critics, Rationale)

a. Is there a need for a current review of crash-rescue requirements for airports with various levels of activity?

b. Can improved extinguishants and techniques be employed to improve the effectiveness of the crash-rescue function?

7. ALTERNATIVES (Impacts: Cost, Energy, Environment, OSHA, etc.)

a. Limit activities to the monitoring and evaluation of developments initiated by the Department of Defence.

b. Proceed with an in-house program to develop and/or evaluate new crash-rescue concepts to determine if improved rescue capabilities are possible.

8. RECOMMENDATION: Continue with Alternative b.

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1. PROJECT TITLE: SAFER ADVISORY COMMITTEE UPDATE: 8/4/80

2. RELATED PROGRAM/PROJECTS: Crashworthiness and Post Crash Cabin Safety

3. OBJECTIVE:

Obtain recommendations from the industry and from within the government regarding what actions the FAA should take to achieve improved occupant survivability in impact-survivable accidents accompanied by fuel fed fires.

4. PROBLEM (Source, Scope, History & Documentation, etc.)

Improvement is needed in the survivability of accidents regarding the factors associated with fuel fed fires.

5. CURRENT STATUS (Interim Actions)

The SAFER Committee is charged with submitting their recommendations for agency action to the Administrator. A draft report has been received.

6. ISSUES (Advocates/Critics, Rationale)

Is the FAA's aircraft safety program responsive to the needs of the nation?

7. ALTERNATIVES (Impacts: Cost, Energy, Environment, OSHA, etc.)

None, currently.

8. RECOMMENDATION

Continue to support the committee's activities to assess the government safety programs. Most of the recommendations are known to have been incorporated in program plans. The report, when issued, should be evaluated from the standpoint of initiating interim actions or advancing development schedules.

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1. PROJECT TITLE: EVACUATION SYSTEMS UPDATE: 8/4/80

2. RELATED PROGRAM/PROJECTS: Post Crash Cabin Safety

3. OBJECTIVE:

Maximize the ability of cabin occupants to evacuate an aircraft by providing: adequate emergency lighting systems; slide reliability and integrity; and functional flotation devices.

4. PROBLEM (Source, Scope, History & Documentation, etc.)

EMERGENCY LIGHTING

The three areas of concern with respect to emergency lighting systems are: lighting systems reliability; illumination adequacy during night evacuation; and visibility obstruction from smoke concentration in the event of a fire.

EVACUATION SLIDES

There is evidence that slides are rendered unusable by adverse wind conditions, fire, and malfunctions involving the slide and automatic exit systems.

FLOTATION DEVICES

There have been numerous incidents of occupant difficulty in retrieving and using life preservers, floatable seat cushions, and life rafts.

5. CURRENT STATUS (Interim Actions)

EMERGENCY LIGHTING

Airworthiness Review Amendment 25-46 was issued Oct 1978 to improve exit handle illumination and lighting system controls. Full scale fire tests, underway at the Technical Center, are investigating various types and locations of lighting systems under realistic smoke conditions. The program is expected to be completed in 1980.

EVACUATION SLIDES

Requirements for improved slide reliability and wind performance were introduced in Airworthiness Amendment 25-46, effective December 1978. A R&D program was initiated in October 1978 to further assess slide materials for improved fire protection. Projected completion date for this program is October 1980.

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EVACUATION SYSTENS (Cont'd.)

FLOTATION DEVICES

FAR 121.340 states that no person may operate a large airplane in any overwater operation unless it is equipped with life preservers or with an approved flotation means for each occupant.

FAR 121.339 requires a life preserver equipped with an approved survivor locator light for each occupant of an airplane in overwater extended operations.

6. ISSUES (Advocates/Critics, Rationale)

EMERGENCY LIGHTING

Requirements covering increased size and brightness of exit signs and more uniform illumination of aisles on transport aircraft were adopted under Amendment 25-32 in May 1972. This provided the basis for lighting performance now exhibited in current wide-bodied aircraft. However, in 1971 and 1972 survivable accidents involving non-wide-bodied aircraft resulted in recommendations by the NTSB to improve occupant evacuation visibility during dense smoke conditions.

EVACUATION SLIDES

The 1974 NTSB Special Study Report, AAS-74-3, cited a significant number of deficiencies involving adverse wind conditions and slide malfunctions. Slide failures resulting from aircraft fire were also reported during the recent NTSB investigation of the Los Angles DC-10 accident.

FLOTATION DEVICES

Several air carriers have been granted an exemption from FAR 121.339 which requires liferafts on all air carrier flights that operate beyond 50 nautical miles from the nearest shoreline. The practice of granting exemptions to operate as far as 160 nautical miles from shore has created concern among the general public and certain segments of the aviation community.

With respect to flotation-type seat cushions, NTSB recommendation A-79-36 proposes that the FAA amend 121.340 to require that all passenger-carrying aircraft be equipped with floatable seat cushions so that passengers will have an immediate means of flotation when insufficient time is available to obtain more conventional flotation equipment. In September 1970, the NTSB recomended that the FAA assess the life preserver and life raft standards with respect to difficulty in retrieving/donning life preservers and deploying life rafts. The NTSB has also recommended that the FAA expedite the development and installation of combination slide/raft devices on U.S. air carrier aircraft.

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7. ALTERNATIVES (Impacts: Cost, Energy, Environment, OSHA, etc.)

EMERGENCY LIGHTING

a. Maintain present emergency lighting requirements.

b. Require more effective lighting performance and location to provide for improved occupant evacuation visibility during night and dense smoke conditions.

SLIDES

a. Maintain present standard.

b. Establish a revised slide TSO standard to upgrade slide material burn requirements, particuliarly in the area of heat flux.

FLOTATION DEVICES

a. Amend the present 50-mile limit rule to be consistent with the ICAO standard of 400 miles offshore or 120 minutes from land.

b. Require flotation-type cushions on all passenger-carrying air carrier aircraft.

c. Revise current TSO standards for life rafts, life preservers and floatable seat cushions to insure easy retrieval/use and adequate buoyancy.

8. RECOMMENDATION/ACTION:

EMERGENCY LIGHTING - Implement Alternative b. Reference: E&D program plan, Report No. FAA-ED-18-7, June 1980, Section 2.3.

EMERGENCY SLIDES - Implement Alternative b.

FLOTATION DEVICES - Implement Alternative c. and evaluate the impact of implementing Alternative b.

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